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The MARQUIS OF NORTHAMPTON, President, in the Chair.

"Determinations of the Magnetic Inclination and Force in the British Provinces of Nova Scotia and New Brunswick in the summer of 1847." By Professor George W. Keely, of Waterville College, Maine, United States. Communicated by Lieut.-Col. Sabine, R.A., For. Sec. R.S.

The observations recorded in this paper are of two kinds; first, those for the relative total force, which were made with a pair of Lloyd needles and an inclination-circle, seven inches in diameter, with two verniers reading to single minutes; and secondly, those for the absolute horizontal force made with a unifilar magnetometer. After a detailed description of these instruments, the results of the observations are given, occupying several pages of tables.

April 13, 1848.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

"Minute structure of the Organ of Taste in Vertebrate Animals." Part I. By Augustus Waller, M.D. Communicated by Richard Owen, Esq., F.R.S.

The author states that, in 1839, his attention was first directed to the organ of taste on discovering the peculiar advantages for microscopic examination which are offered by the tongue of the living frog. When prepared in the manner he describes, it is much more transparent than the web of the foot; and its papillæ, mucous membrane, blood-vessels, nerves, muscular fibres, &c. may all be examined during life.

He subsequently found that, contrary to the opinion of anatomists, it contains two species of papillæ distinct in their structure, corresponding to the conical and fungiform papillæ of man.

In the present communication he describes the result of his further researches on the frog's tongue, principally with regard to the ultimate termination of the nerves in the papillæ and the precise nature of the functions of these papillæ in the act of taste, and demonstrates a similar disposition of the nervous extremities in man and the rest of the mammiferæ.

After giving a brief account of the researches of former anatomists, he proceeds to state his method of preparing the frog for examination, which consists in rendering it insensible by exposing it to the vapour of ether or of various other volatile agents. The tongue is then expanded so as to render it perfectly transparent. The conical papillæ he describes as small cones, sometimes simple, sometimes compound. They are composed of globular, or wedge-shaped epithelial cells, generally with a medullary stem running up the centre, giving off small processes to the separate epithelial cells. Each of the papillæ presents, near its summit, a small aperture. The fungiform papillæ are distinguished from the former by their globular shape, larger size, and above all by the existence of a coil of capillary vessels within them, containing blood in a state of active circulation. At their summit or at their sides, the vascular coils are extremely superficial and merely covered by an exceedingly thin membrane. Besides the blood-vessels, these papillæ are invariably found to contain a nerve and also muscular fibres. The nerve consists of about eight or ten simple tubules. At the base of the papillæ it forms several loops, and afterwards ascends between the capillary vessels towards the summit of the papillæ, where its tubules diverge and terminate in abrupt extremities. The author terms that part of the papillæ where the membrane is so attenuated, and where the vessels ramify and the nerves terminate, the *neuro-vascular area*; the muscular fibres ascend into the papilla in the same direction as the nerves, and after nearly reaching the summit, are lost in the tissue surrounding the neuro-vascular area. The nerves of the conical papillæ, contrary to the former, never terminate in abrupt extremities, and consist of a network of nearly single tubules. Neither the nerves nor the vessels of these papillæ ascend into their interior, but are only spread out at their base.

The author deduces from these and other observations which are minutely described in his paper, that the fungiform are the papillæ of taste and the conical those of touch. He considers that by reason of the thinness of the membrane at the neuro-vascular area, a sapid substance must quickly traverse it; the nerves immediately beneath, like the spongioles of the roots of a plant, being acted upon by the sapid substance, convey the sensation of taste to the brain. The active circulation in the capillaries at the same spot appears to be for the purpose of removing by endosmosis the sapid substance from the nerve so as to render it capable of receiving a fresh impression. A further peculiarity exists with respect to these papillæ, which is that they present at their surface an active ciliary movement of which the conical papillæ are devoid. This movement appears to be for the purpose of promoting absorption and of removing any foreign particles from their surface.

He regards the conical papillæ as strictly destined for tactile purposes, on account of the thickness of their epithelium, and the presence of the nervous ramifications at their base, which are similar to those existing at the under surface of the tongue, where the sensation of taste does not exist and the tactile powers alone are present.

The author has extended his observations to other animals, to the mammiferæ, and to Man in particular, and states that in all these the same difference exists between the two species of papillæ. He promises in his next paper on this subject to describe the structure of the mammiferæ.

This paper is illustrated by several drawings.

May 4, 1848.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

"The Brain the sole centre of the Human Nervous System." By Edwin Lee, Esq. Communicated by Samuel Solly, Esq., F.R.S.

It has been inferred by many physiologists, from experiments made on the lower animals, that portions of the human nervous system are isolated and independent of each other; but from the circumstance that in these animals the brain is only a small appendage to the rest of the nervous system, while in the human species it is the principal portion, the author takes an opposite view of the subject. In man, the grey matter, which is the source of the power of the brain, is largely agglomerated in that organ, but is only diffused in comparatively minute proportions throughout the other parts of the nervous apparatus, which, when detached from the central organ, speedily lose the power of exciting muscular contraction, because this power is derived exclusively from the brain, and only such a portion is retained in the grey matter of the spinal cord and the ganglia of the sympathetic as is requisite for the immediate actions of the parts which they supply with nerves.

The opinions of Galen, of Willis, and of the more recent physiologists, Louget, Muller, Dugès, Carus, Pinel, Foville, Flourens, Cruveillier, are cited at some length in corroboration of the views of the author, and in opposition to those of Bichat, and others of the older physiologists, together with those of Sir C. Bell, Mr. Grainger, Dr. M. Hall, Kolliker, Stilling, and others, and tending also to disprove the excito-motory theory of Dr. M. Hall, as regards its applicability to medical practice. Quotations to the same effect are given from Valentin, Volkmann, Fauvel, Mery, Cabanis, and Legallois; and reference is likewise made to pathological illustrations, and to the instances of anencephalous infants, as leading to the following deductions:—

1. In man and the higher mammalia, the brain is the sole centre of the nervous system and the source of its power.

2. The grey matter of the spinal chord and the ganglia of the sympathetic are to be considered as reservoirs of this power, for the immediate action of the parts supplied, which speedily become exhausted if communication with the brain be cut off; and also as modifiers of impressions transmitted from the organs of the brain.

3. The automatic and instinctive actions are not performed independently of the concurrence of the brain, though its influence on these actions is less direct and manifest than in the case of voluntary movements.

4. In several disorders which have been too exclusively referred to the spinal chord, the brain is the organ principally implicated.

"On the Protection of Iron from Oxidation and from becoming foul when it is exposed to the action of sea and other waters." By Mr. William John Hay. Communicated by Admiral Beaufort, F.R.S.

For attaining the objects mentioned in the title of this paper, the author was led by a process of experimental research, founded on chemical principle, to the discovery of the superior efficacy of a varnish consisting of one part of pitch and two parts of naphtha, together with ten pounds of the sub- and per-oxides of copper to each quart of the varnish. This varnish is made to adhere by applying it to the iron previously rendered hot by placing underneath it braziers of ignited charcoal. He found that this coating of varnish not only protected the iron from oxidation, but formed a perfect barrier to electro-chemical action between the copper oxide and the iron. Two or three of these coats are applied in succession, each being laid on after the preceding one has become hardened. The trials made of this method on various ships, the results of which are detailed in an appendix to the paper, have proved perfectly satisfactory.

May 11, 1848.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

"On the Chemical Nature of a Wax from China." By Benjamin Collins Brodie, Esq. Communicated by Sir Benjamin Collins Brodie, Bart., F.R.S.

The wax which is the subject of this investigation, is a substance imported into this country from China. It has the general appearance of spermaceti, but is harder than that body. The author gives reasons for believing that this wax, like bees'-wax, is a secretion from an insect.

The wax may be decomposed by fusion with hydrate of potash, by which process two substances are procured; namely, a wax acid, which, combined with the potash, forms a soap; and another body which is dissolved in the soap solution. By precipitation with chloride of barium and washing out the dried baryta salt with ether, or other suitable solvents, the two substances may be separated.

The substance dissolved in the ether has the appearance of a wax. By crystallization its melting-point may be raised to 79° C., at which point it is fixed. The body, when analysed, gave numbers agreeing with the formula $C_{54} H_{56} O_2$, the formula, namely, of the alcohol of cerotic acid, the acid which in a previous paper the author has shown to exist in a free condition in bees'-wax, and the constitution of which he there determined. To this alcohol the author gives the name of *cerotine*. By oxidation, by means of lime and potash, the alcohol is capable of being converted into cerotic acid, $C_{54} H_{54} O_4$. The analyses of the acid and of its silver salt are given. The formula of the alcohol is further confirmed by the analysis of its combination with sulphuric acid; and the process to be employed to procure this substance is detailed. Its formula is $SO_3, C_{54} H_{55} O + HO$; the sulphate of the oxide of cerotyle, using the usual chemical language to express the nature of the combination. By the action of chlorine on the alcohol, the alcohol-type is destroyed, and a body is formed, analogous to chloral, containing two equivalents of hydrogen less than the alcohol itself. The analyses lead to the formula $C_{54} \left\{ \begin{matrix} H_{40\frac{3}{4}} \\ Cl_{13\frac{1}{4}} \end{matrix} \right. O_2$. The substance has the appearance of a resin.

By decomposing the above-mentioned baryta salt, after the cerotine has been entirely removed by washing with suitable solvents, the same cerotic acid may be obtained as that into which the alcohol itself is converted by oxidation. The analysis of the acid and of its silver salt is given.

This Chinese wax cannot be distilled without decomposition. By its distillation two substances are procured; cerotic acid, $C_{54} H_{54} O_4$, and hydrocarbon. The hydrocarbon consists principally of a solid matter, one of those substances which, in the opinion of the author, have been indiscriminately classed together under the general name of *paraffine*. This substance, to which he gives the name of *cerotine*, contains equal equivalents of hydrogen and carbon, and has the formula $C_{54} H_{54}$. This formula is determined with precision by the action of chlorine on the substance, which gives rise to a series of products of substitution, of which several were analysed, namely the substances

$$C_{54} \left\{ \begin{matrix} H_{35} \\ Cl_{19} \end{matrix} \right. , \quad C_{54} \left\{ \begin{matrix} H_{33} \\ Cl_{21} \end{matrix} \right. , \quad C_{54} \left\{ \begin{matrix} H_{32} \\ Cl_{22} \end{matrix} \right. .$$

The density of the vapour of cerotine cannot be taken, as, by distillation, it is decomposed. The experiment was made of distilling and redistilling the substance in a sealed tube, in which cases it passes entirely into fluid and gaseous hydrocarbon.

The analysis of the Chinese wax itself corresponds with the formula $C_{108}H_{108}O_4$, which admits of a simple explanation of the nature of its decompositions: its decomposition by potash being explained by the equation

$$C_{108}H_{108}O_4 + KO\,HO = (C_{54}H_{53}O_3 + KO) + C_{54}H_{56}O_2,$$

and its decomposition by heat by the equation

$$C_{108}H_{108}O_4 = C_{54}H_{54}O_4 + C_{54}H_{54},$$

the substance itself belonging to the class of compound ethers.

The author announces his intention of following up this paper by a third on the constitution of myricine.

May 18, 1848.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

"On a new case of the Interference of Light." By the Rev. Baden Powell, M.A., F.R.S. &c., Savilian Professor of Geometry in the University of Oxford.

The principal experiment exhibiting the newly-observed case of interference described by the author, is the following: into a hollow prism or trough containing oil of sassafras, anise, cassia, &c., a plate of glass is dipped so as to intercept the light passing through the upper or thicker half of the prism, and leave the lower half clear: the spectrum of a line of light or narrow slit, is then immediately seen to be covered with dark bands parallel to the slit or edge of the prism.

Some substances, as oil of turpentine, water, &c., give no bands with this arrangement, but will give them, if a complementary arrangement be adopted, viz. by placing a narrow slip of glass at the bottom of the prism, or so as to intercept the light passing through the thinner half.

The production of the bands in general, and the reason of the difference existing in the cases referred to, are fully accounted for on the theory of waves and interference: whence the following formula is deduced, giving the number of bands (n), when μ_p and μ_m, the indices for any ray for the plate and for the medium, are known, of which λ is the wave length; and taking these quantities for any two rays (1) and (2) of the spectrum, τ being the thickness of the plate, we have the number of bands between them expressed by

$$n = \left\{ \left(\frac{\mu_p - \mu_m}{\lambda} \right)_1 - \left(\frac{\mu_p - \mu_m}{\lambda} \right)_2 \right\} \tau.$$

The numbers thus calculated agree with observation for many media. The distinction of the two cases alluded to depends on whether n result positive or negative; that is, on the relative values of the indices; also agreeing with observation.

If doubly refracting media are used as plates, two sets of bands are seen superimposed, which are easily shown to be due to the ordinary and extraordinary rays respectively. But for some of these crystals the data are as yet insufficient to give more than a general accordance with theory.

The method might be applied practically for determining the indices of many substances to which the ordinary method is inapplicable from the impossibility of forming them into prisms: it will also exhibit palpably the most insensible degree of double refraction, and may thus become useful to the mineralogist.

There is a close analogy between these phenomena and those observed by Baron von Wrede, and by Sir D. Brewster and Mr. Fox Talbot, of which Mr. Airy has given a theory. A similar theory is necessary for explaining some of the more minute details of the present phenomena; and on this subject some extensive researches have been pursued by Mr. Stokes of Pembroke College, Cambridge, which will soon appear.

"On the Meteorology of the Lake District of Cumberland and Westmoreland." By John Fletcher Miller, Esq. Communicated by Lieut.-Col. Sabine, R.A., For. Sec. R.S.

The author has devoted nearly four years to the investigation of the quantities of rain falling in the lake districts of Cumberland and Westmoreland; and he commenced, two years ago, a set of experiments specially directed to ascertain the amount of rain deposited at great elevations above the sea, such as the summits of our highest English mountains. As the investigation proceeded, some remarkable results were obtained, which coming to the knowledge of the Royal Society early in last year (1847), the Council contributed a sum of money from the Donation Fund towards the current expenses attending this inquiry, of which the results are given in the present communication, comprising extensive tables of observations relative to the quantity of rain in different situations within the above period of time.

May 25, 1848.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

"On the structure of the Jaws and Teeth of the Iguanodon." By Gideon Algernon Mantell, Esq., LL.D., F.R.S., Vice-President of the Geological Society, &c.

The recent discovery of the right dentary bone of the lower jaw of an adult Iguanodon with teeth, having enabled the author, with the aid afforded by other specimens, to determine the structure of the maxillary organs of that gigantic herbivorous reptile, the result of his investigations are embodied in the present communication.

The first memoir of the author on the teeth of the Iguanodon was published in the Philosophical Transactions for 1825; but owing to the fragmentary and water-worn condition in which the fossil remains of terrestrial vertebrated animals occur in fluviatile deposits, in consequence of these strata consisting of materials transported from far-distant lands, nearly a quarter of a century elapsed before any portion of the jaw with teeth was discovered.

The most important of the fossils described in this memoir consists of the anterior part of the right side of the lower jaw, which was discovered a few weeks since, in a quarry in Tilgate Forest, by Capt. Lambart Brickenden, F.G.S., who with great liberality placed it at the disposal of the author as the original investigator of the fossils of the Wealden.

This dentary bone, which is eighteen inches long, is perfect in the anterior part, but is broken at the hinder extremity, and retains five or six inches of the coronoid bone: the length of the jaw to which it belonged is estimated at four feet. It contains two successional teeth in place, the fang of a third, and the alveoli or sockets for eighteen or nineteen mature molars; the entire number of teeth on each side the lower jaw was about twenty.

The mature teeth, which, when abraded by use in mastication, resemble the worn molars of herbivorous mammalia, appear to have been arranged in a close-set series. The lower teeth had their enamelled striated face parallel with the alveolar plate, and fronting the inside of the mouth; but the upper were placed in a reverse position, that is, with the enamelled facet of the crown external; and the teeth in the upper and lower jaws were arranged subalternate or intermediate in relation to each other, as is the case in the ruminants.

But a still more remarkable character presented by this specimen is the peculiar construction of the anterior part of the lower jaw, which forms the symphysis. This process, instead of being continued round the front of the mouth and beset with teeth, as in all other saurians, is edentulous, and extends into a procumbent scoop-like expansion, very analogous to the symphysial portion of the lower jaw in the Sloths, and especially to that of the colossal extinct Edentata—the Mylodons. Along the external surface of this dentary bone there is a row of very large vascular foramina; and the symphysis also is perforated with numerous openings for the passage of blood-vessels and nerves sent off from the great dental canal. The unusual number and magnitude of these foramina indicate a great development of the integuments and soft parts with which the bone was inevsted, and also the large size of the under lip.

The upper jaw, of which a considerable portion discovered by the author is in the British Museum, confirms the inferences deduced from the teeth and dentary bone of the lower maxilla.

The author, with the able assistance of Dr. A. G. Melville, instituted a comparison between all the teeth of the Iguanodon to which he could obtain access, and those of recent saurians; and the result of the investigation is detailed. The new light shed on the structure and functions of the dental organs, confirms, in every essential particular, the inferences deduced by the author from the detached teeth alone, in his memoir of 1825; and it also reveals an extraordinary deviation from all known types of reptilian organization, and which could not have been predicated; namely, that this colossal reptile, which equalled in bulk the gigantic Edentata of South America, and like them was destined to obtain support from comminuted vegetable substances, was also furnished with a large prehensile tongue and fleshy lips, to serve as instruments for seizing and cropping the foliage and branches of trees; while the arrangement of the teeth as in the ruminants, and their internal structure, which resembles that of the molars of the Sloth tribe in the vascularity of the dentine, indicate adaptations for the same purpose.

Among the physiological phænomena revealed by Palæontology, there is not a more remarkable one than this modification of the type of organization peculiar to the class of reptiles, to meet the conditions required by the economy of a lizard placed under similar physical relations, and destined to effect the same general purpose in the scheme of nature, as the colossal Edentata of former ages, and the large herbivorous mammalia of our own times.

From the facts detailed, the author is led to consider the specimen described in his memoir of 1841, as being probably the lower jaw of a young Iguanodon (but the true nature of which, from the absence of the crowns of the teeth, was doubtful) belonging to the same family, but referable to a distinct genus or subgenus; and he proposes the name of *Regnosaurus Northamptoni* for that remarkable fossil saurian. The communication was illustrated by several drawings of the specimens described.

"An Account of some Observations made on the Depth of Rain which falls in the same Localities at different altitudes in the hilly districts of Lancashire, Cheshire and Derbyshire." By S. C. Homersham, C.E. Communicated by George Newport, Esq., F.R.S. &c.

The author states, that having been present at a meeting of the Royal Society when a paper was read on the Meteorology of the Lake districts of Westmoreland and Cumberland, by J. Miller, Esq. of Kendal, in which it was stated that the quantity of rain falling in mountainous districts appears to increase from the valley upwards, to the altitude of about 2000 feet, and then rapidly to decrease, he wishes to lay before the Royal Society the results of his own observations, which lead him to a different conclusion. After stating that he had been at some trouble to analyse Mr. Miller's observations which have been communicated to him by that gentleman, he is of opinion that they do not warrant the conclusion deduced from them, and are also at variance with the recorded observations of Daines Barrington, Dr. Dalton, Professor Daniell and others, as well as those of Capt. Lefroy and Col. Sabine.

The author then shows from observations very carefully made in Lancashire, Cheshire and Derbyshire, from January 1846 to March 1848, that more rain falls at the bottom than at the tops of hills of a less elevation than 2000 feet in the same locality, and that the quantity diminishes in a ratio almost precisely corresponding to the height. The details are given in tables of monthly observations, made near Whaley and Congleton in Cheshire, and Chapel-en-le-frith in Derbyshire, and also of other observations made for the Corporation of Liverpool at Rivington and in the valley of Roddlesworth near Preston in Lancashire, which have been communicated to him. The whole of these observations, carefully analysed and compared, have led the author to a conclusion opposite to that arrived at by Mr. Miller.

The author then proceeds to show that the details of Mr. Miller's own observations are in accordance with his, and that they fully bear out his views, and not those of that gentleman. Some apparent discrepancies in the results are pointed out and their cause explained by reference to peculiarities in the localities in which the observations were made, as shown by reference to a map accompanying this paper, and to the details given by Mr. Miller; so that the observations of this gentleman, when examined with reference to locality, fully confirm those of the author and of the authorities he has quoted, and establish the proposition, that as a general law, the quantity of rain deposited in the valleys and at the bottoms of hills is greater than in more elevated situations in the same locality.

"Microscopical examination of the contents of the Hepatic Ducts." By Thomas Wharton Jones, Esq., F.R.S.

On a microscopical examination of the matter contained in the larger hepatic ducts, the author has observed what he considers the debris of broken-up hepatic cells, in the form of free nuclei, a granulous substance, oil-globules and fragments of cell-walls; while in the matter contained in the smaller branches of the duct, entire cells of hepatic parenchyma may, in addition, be seen. These facts the author adduces as proofs that the cells of hepatic parenchyma are analogous to the endogenous cells, or true secretory corpuscles of the pancreas and other glands; and he infers that as the endogenous cells of other glands are constantly being reproduced, successively cast off, received into the radicles of the ducts (into which the containing vesicles or tubules of the former open), broken up and resolved into the secreted matter, so the cells of hepatic parenchyma are received into the radicles of the hepatic duct as they are successively cast off, and are there broken up and resolved into bile. This conclusion, namely, that the hepatic cells are analogous to the endogenous cells of other glands, as was first suggested by Professor Henle of Heidelberg, and not to glandular vesicles as has been assumed by some, the author considers as throwing light on the anatomical relation of the hepatic cells to the radicles of the hepatic ducts.

"Researches on the Function of the Intercostal Muscles, and on the Respiratory Movements, with some remarks upon Muscular Power in Man." By Dr. John Hutchinson. Communicated by Sir Benjamin C. Brodie, Bart., F.R.S.

This paper is an abridgement of a former one, bearing the same title, by the same author, which was read to the Society on the 17th of June, 1847, and of which a full abstract is contained in the fourth volume of the 'Proceedings,' p. 691. The long historical memoir, and quotations from former authors, have now been omitted.

"Attempt to apply instrumental measurement to the Zodiacal Light." By Prof. C. Piazzi Smyth.

After describing the manner in which the zodiacal light was first strongly represented to him in South Africa in 1843, and which seemed to imply that some of the received opinions with regard to it were erroneous, the author describes an equatorial instrument which he contrived for the purpose of measuring the right ascension and declination of the apex of the light; some instrumental method of determining these data, and thence the principal phenomena of the appearances, being evidently desirable on account of the immense extent to which the judgement may be biassed by prejudice or casual circumstances, when the mere senses are trusted to for determining the extent, situation and character of so faint and vague a body.

The most favourable astronomical, atmospheric and personal conditions requisite to obtain undeniable observations of the zodiacal light are pointed out; and aided partly by strict attention to these, and partly by the clear atmosphere of the high mountains on which he was then residing, the author found the phenomenon to be of a far more stable and determinate character than has generally been represented; and his observations, made by the above instrument in the years 1844–45, of which a list is given, seem to be affected with a probable error not greater than 2°.

Since his return from the Cape, the author's geographical position has wholly prevented him from continuing his observations: he therefore now publishes his experiences to induce others in more favourable situations to follow up the subject; which by comparing his results with those of other observers in the northern hemisphere, he shows has many of its principal features in a state of ambiguity, that ought not in the present day to be allowed to exist any longer; and further, to enable others to take up the subject as nearly as possible as he left it off, the author adds to his paper a series of views of the different appearances of the zodiacal light at various seasons of the year, and explains the peculiar projections employed to give a true as well as a pictorial representation of the sky.

The ordinary Meetings of the Society were then adjourned to Thursday, November 16.

June 9, 1848.

The General Meeting for the election of Fellows was held this day, The MARQUIS OF NORTHAMPTON, President, in the Chair.
The President addressed the Society as follows;—

Gentlemen,

I have generally commenced my annual addresses to you, by returning my thanks to my colleagues in the Council for the assistance that I have received from them in performing my presidential duties. On the present occasion I must extend my acknowledgement, and express, in the warmest manner that I am able, my grateful sense of the unvarying kindness that I have experienced at the hands of the Society at large.

Holding our General Meeting, as we now do for the first time in June, six months only having elapsed since the election of the last Council, there are many topics of former addresses which will form no part of that which I now deliver. The time for the award of our Medals has not yet arrived. It would also be premature to give an obituary, before the official announcement, of the names of those Fellows whom we have lost, which announcement will take place as usual on St. Andrew's day. I presume, however, that henceforth the obituary will be read in June, with reference to the deaths declared in the preceding November. This will in some respects be more convenient, and will give additional time for its due preparation.

I regret extremely, that I have it not in my power to announce to you that any intelligence has arrived respecting the Northern Expedition of Sir John Franklin. It is hardly necessary for me to mention, that both by land and sea the Government has taken steps to obtain intelligence of, and also to give assistance to our gallant explorers. I am sure you will all join me in the fervent wish that Heaven may prosper these endeavours.

I have to inform you, that the Council of the University of London have been so kind as to grant us the temporary loan, if we should have occasion to wish for it, of three rooms adjoining to ours and to those of the Society of Antiquaries. This concession may be very convenient to the Royal Society. One of these rooms is lent to the Society of Antiquaries, for their use, on Thursday evenings: I need hardly say, therefore, that at those times, we could not make use of them, and that it would have been the farthest thing from the wish of us all to interfere with the accommodation of a Society, with which we have always been, and I trust always shall be, on the most friendly terms: indeed, so many of our Fellows form also a portion of the Society of Antiquaries, that there must always be a mutual bond between us. On your part then, Gentlemen, I beg to express our thanks to the Chancellor and Council of the University of London.

Today, Gentlemen, come into operation for the first time our new regulations on the subject of election. I have never concealed my own doubts on the main feature of these regulations. I believe that many Fellows of the Society participate in these doubts, but it would be to me a matter of the deepest regret if they do not receive a fair trial. Still more should I deplore the result, if the supposed errors of these regulations were to be visited on the unoffending

Candidates. In saying this I hope it will be understood that I do not wish in the least to interfere with the free exercise of the rights of the Fellows. The Council would have no right to complain, because every Candidate selected by them was not elected, and still less because some were to be elected whom they had not named; for I need scarcely repeat, that the Fellows may elect all the Candidates before them, or none of them. The latter alternative would however convey an expression of opinion against both the claims of the Candidates and the justice of the Council's selection neither complimentary nor just. I therefore really think that the Council would be hardly treated, if at least the greater part of the selected Candidates were not elected.

It is rather a singular circumstance, that, since our selection was made, one of the gentlemen whom we had chosen, Mr. Syme, should have withdrawn his name. The stringency of our rules has afforded the Council no means of supplying his place. The possibility of occurrence of such a case had not arisen in the minds of the former Council, when the new rules were framed, but it may perhaps be considered next year whether it ought to be provided against, or whether it is likely to occur so seldom as not to require any special provision.

Many of you are probably cognizant of the Winteringham bequest, by which an annual sum of money was left to be invested in the purchase of a silver cup as a prize for a scientific essay. To the good intention of the testator I am bound to express our obligation. The conditions of the bequest are however so complicated and troublesome, that it appears hardly possible to comply with them; and it is besides extremely problematical whether the prize would really obtain essays worthy of it. In that case it is obvious that no benefit would be conferred on science, while the Royal Society would find itself placed in what has been called a false position. I have therefore thought it best, in agreement with the opinion of your Council, and of other Fellows whom I have also consulted, to do nothing in the matter in this the last year of my presiding over you, leaving the question to be fully and maturely decided by my successor and the Council, with whom he will have to deliberate.

With politics, in their ordinary sense, we as a Scientific Society have nothing to do, except as far as public events may tend to favour or discourage those studies, for the promotion of which the Royal Society was established. I cannot but fear, Gentlemen, that the promotion of scientific progress will be retarded by the disorder that at present exists on the Continent, and by the degree in which men's minds are engaged in state affairs. It is creditable, I think, to foreign governments under such circumstances, that the combined prosecution of magnetical inquiries is still continued. This combined inquiry is however soon coming to an end, but I hope that the ingenious self-registering instrument invented by our colleague Mr. Brooke, and now most successfully employed in the Royal Observatory at Greenwich, may find its way into other national establishments, and by that means enable other countries to continue inquiries without any serious expense. It must be within your cognizance, Gentlemen, that many schemes for alterations in our Society have been of late suggested, or, to speak more correctly, have been hinted at, for nothing distinct or definite has been proposed, as far as I know. Those who advocate such plans should always remember that the Royal Society is not placed, like the Institute in France, under the protection of the government, nor supported at the public expense. Whether that be a gain or not is not a question for our consideration, but for my own part I should be sorry to exchange our independence for any other advantage. As however we have to support ourselves, any such extreme restriction of our numbers as should make us a very select body would deprive us of the power of publishing those Transactions, which constitute the main part of our scientific usefulness. Our body consists not only of men of science, but also to a certain extent of literary men, eminent artists and gentlemen of rank and station. I believe that this widening of the basis of our Society is most useful to it, and besides serves the important purpose of enlisting in the cause of science those who may patronize and defend, though they do not follow her.

There are some persons who seem to think that it would be advisable for us, not only to be a common link and bond for the other Societies of London, but also actually to unite with them, and thus to form one monster Society. This is certainly an imposing scheme, but I very much doubt its practicability, and still more its advantage to the cause of science itself. I doubt whether any one Society could follow out all the ramifications of individual branches of knowledge as they are now followed out by the Linnæan, Astronomical and Geological Societies. It may however be worth considering whether we might not lend our rooms for the service of some of those Societies that have not convenient places of meeting. This we have already done, in some instances, to the Commission on Weights and Measures. Of course, however, nothing of this kind should be done without mature consideration.

There cannot be a doubt, Gentlemen, that the establishment of separate Societies must have deprived the Philosophical Transactions of many papers of great interest; and this has probably led to the notion that our Society is less flourishing than it was. As, however, I believe that the whole number of scientific papers published in England is increased, and as the object of the Royal Society is, not our own glory, but the improvement of natural knowledge, and the scientific honour of the country, we ought not to regret that valuable communications adorn other Transactions than our own. We ought also the less to regret this circumstance, as most of the principal supporters of other Societies are members of our body also. At the same time we may sometimes feel sorry that particular communications are not made to us, and we may perhaps think that some of our Fellows are not quite so mindful of us as they should be.

After filling the honourable office of your President for ten years, I think it is now right to surrender it to some one who has higher qualifications for it than I can pretend to possess. I have long entertained the opinion that it was not desirable that an individual should hold it for life, as has been the case with some of my predecessors, though I do not quite agree with those who think that its tenure should be limited to a very short period. You are probably aware that it is the intention of your Council to recommend as my successor a nobleman who has displayed for a long series of years the greatest zeal for the progress of Astronomy. You must all be aware, Gentlemen, of the wonderful telescope made by Lord Rosse, the great ingenuity displayed in its construction, and the labour and expense that it must have cost its constructor. These are strong claims on the Royal Society, and strong guarantees for his future zeal in your service, and in that of science in general. I do not hesitate to add, and the more so as some seem inclined to demur to my opinion, that it is clear to my own mind that his rank and station are additional reasons in his favour. I am not, indeed, one of those who hold that any rank or position, however exalted, can confer honour on science: on the contrary, I shall always maintain that science confers honour on them: it is, however, not less clear that the possession of wealth, of rank, and of station, gives to their possessors the power of aiding science in various ways; and this is the real point to be considered. On the question, however, of my successor, which is one for your decision, I feel that it would be indelicate and improper for me to say more.

In retiring from the office of your President, whatever may have been my other deficiencies, I trust no one can justly reproach me with want of zeal for your interests and your honour. To my colleagues in the different Councils, who have been elected by the general body, I must attribute whatever prosperity may have attended the Society during the last ten years. In looking back to that period, there are three circumstances that give me unmixed pleasure. The first of these is the very important series of papers on Electro-Magnetism, for which we are indebted to a philosopher, of whose presence among us we have especial reason to be proud: I need hardly name to you Professor Faraday. The second point to which I refer is the prompt attention that was paid by the British Government to the joint recommendation of the Royal Society and the British Association to send an expedition for scientific purposes to the southern regions of the globe. The glory which has attended the successful exertions of Sir James Ross and his brave comrades is reflected not only on his country, but also on the Societies that recommended, and the Government that sent out the expedition.

The third subject that claims my attention, and to which I have already alluded, is the great conjoint inquiry on Terrestrial Magnetism, still going on, and owing its origin to the united recommendations of the British Association and the Royal Society.

It is true that this object had been brought before the notice of the Royal Society some years before by one of the most illustrious of modern travellers and philosophers, the author of 'Cosmos,' M. Humboldt; but the immediate origin of the undertaking was the recommendations of the two English societies, acting on foreign Governments through our own. To the Foreign Secretary of the Royal Society, in conjunction with Dr. Lloyd of Dublin, was confided the important task of drawing up the regulations under which the inquiries of associated *nations*, instead of associated *individuals*, were to be carried on.

In the case, too, of the South Polar Expedition, the Royal Society was applied to by the Government for scientific recommendations; and your Council, in conjunction with your different scientific Committees, drew up a Report of the highest value, not only to the particular voyage for which it was specially prepared, but also for all other similar undertakings, and even for every scientific traveller in little-known regions of the globe.

It would be invidious, Gentlemen, to allude to individual papers that have been published in your Transactions during the term of my Presidency. I should not, indeed, be capable of doing justice to all, even if time permitted, which it certainly does not. I may perhaps, however, allude to one philosophical invention described in them, as being most important to the great inquiry on Terrestrial Magnetism—I mean Mr. Brooke's Photographic Self-Registering Instrument, which I have already mentioned. On the same head, I may take the opportunity to return the thanks of the Society to Colonel Sabine for the labour he has bestowed on the Magnetical Observations made at Toronto and elsewhere.

You will all rejoice, Gentlemen, I am sure, to see the zeal that is shown without as well as within the Royal Society in the cause of science; to see the continued prosperity of the British Association; to see our new as well as our old Societies flourishing; to hear of fresh discoveries in Astronomy; to see the great collections of Natural History in the British Museum and the College of Surgeons augmented every year; to find our knowledge of the wonderful animals now extinct,—of the *Dinornis*, *Iguanodon*, and other monsters of antiquity,—increased by the labours of an Owen, a Mantell, and others; to see a magnificent pile rising to contain specimens of the economic geology of Great Britain and Ireland, and of the finished products of Art that owe their existence to it.

These, Gentlemen, are all reasons why we should rejoice, and also to see the increased degree in which the importance of science is acknowledged for ship-building, for agriculture, and for the preservation of human life and health in our great cities, in the great hives of human industry. But they are not only reasons for rejoicing, they are reasons why we should return our hearty thanks to Almighty Providence for thus blessing our land. Lastly, we should remember that where so much has been given much will be required, and that it is our duty to extend these blessings as far as we can for the happiness and comfort of our fellow-men.

On the motion of Sir R. H. Inglis, Bart., the thanks of the Society were voted to his Lordship for his Address, with a request that he would allow it to be printed.

The President having directed the senior Secretary to read the Statutes for the election of Fellows, Sir Charles Lemon, Bart., and Mr. Wheatstone, were, with the consent of the meeting, appointed Scrutators. Mr. A. J. Stephens then moved that the meeting do now adjourn. The motion was seconded by Dr. John Lee, but on being put to the question was declared to be lost.

The election was then proceeded with, when the votes of the Fellows present having been collected, the following gentlemen were declared to have been duly elected:—

George Bishop, Esq.
Rev. James Challis.
Henry Clerk, Capt. R.E.
William Fergusson, Esq.
Robert Were Fox, Esq.
Henry James, Capt. R.E.
Robert Gordon Latham, M.D.
John Henry Lefroy, Capt. R.A.
James Ormiston M'William, M D.
Thomas Oldham, Esq.
Lyon Playfair, Ph.D.
Robert Porrett, Esq.
John Stenhouse, Ph.D.
Allen Thomson, M.D.

The thanks of the Society were voted to the Scrutators, and the meeting adjourned.

November 16, 1848.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

The time of the Meeting was occupied in reading the Minutes of the last Ordinary Meeting and of the General Meeting.

November 23, 1848.

GEORGE RENNIE, Esq., Treasurer, in the Chair.

"On the Chemical Nature of Wax."—Part III. "On Myricine." By B. C. Brodie, Esq. Communicated by Sir B. C. Brodie, Bart., F.R.S.

This paper is the last of three papers on the chemical nature of wax, and contains the investigation of that portion of bees-wax which is soluble only with difficulty in boiling alcohol. This body could never be rightly investigated before the discovery of the true nature of the other constituent of the wax, namely, the cerotic acid, for the absence of which no test was known, and the products of the decomposition of which would materially interfere with any experiments on the nature of the myricine. When the cerotic acid has been absolutely removed by repeated boiling of the wax with alcohol, a substance remains, which is saponifiable, but with difficulty. From the products of saponification the author isolated palmitic acid, $C_{32} H_{32} O_4$, and a new wax-alcohol, analogous to, but yet different from cerotine, described in a former paper. This alcohol, melissine, has the formula

$C_{60}H_{62}O_4$. By oxidation of this substance by means of lime and potash, the acid $C_{60}H_{60}O$, melissic acid, was obtained; and by the action of chlorine, a body analogous to chloral, a substance, that is, of the aldehyde series, but with a substitution of between fourteen and fifteen equivalents of chlorine for hydrogen. In its conversion into this substance the alcohol loses two equivalents of hydrogen, without substitution. The author also investigated the products of the distillation of myricine. From these he procured likewise palmitic acid and a solid hydrocarbon, which, rectified over potassium, had a melting-point of 62°, and contained, as shown by analysis, carbon and hydrogen in *equal* equivalents. The analogy of the mode of formation of this substance to cerotine from Chinese wax shows that it is the hydrocarbon, melene, $C_{60}H_{60}$. By repeated crystallization from ether a substance was obtained from the impure myricine, of a crystalline character, melting at 72°; the analysis of which agrees with the formula $C_{92}H_{92}O_4$, which explains the reactions of the substance.

The general conclusion from this investigation is, that waxes are a class of bodies which, chemically speaking, stand in the same relation to fat as fatty bodies do to the alcohol and acetic acid of vinous fermentation; all which bodies are members of one chemical series, possess an analogous chemical character, and are susceptible of analogous transformations.

Robert Gordon Latham, M.D., was admitted into the Society.

"An account of Astronomical Observations proposed to be made in South America." By S. M. Gilliss, in an extract of a letter to Lieut.-Col. Sabine, R.A., For. Sec. R.S. Communicated by Lieut.-Col. Sabine.

DEAR SIR, Washington, October 25, 1848.

During the month of April last I sent to you, through the Royal Society, a printed report from one of the naval committees in congress, recommending a grant of funds for the purpose of sending an astronomical expedition to the most available point in South America, to make observations which should have for their object the improvement or verification of the solar parallax. The basis of this report was a correspondence between Dr. Gerling of Marburg, other astronomers, and myself, that had been presented for consideration by the Secretary of the Navy, and, in accordance with the views of the Philosophical Society and of the Academy of Arts and Sciences, had been laid before congress for their decision.

Conformably with the recommendation of the committee, an appropriation was made, and the Honourable Secretary of the Navy directed to employ it in making the observations requested by the two societies just named. The command of the party has been assigned to me, and a plan of operations submitted to the societies having received their sanction, has been approved by the Secretary. This is briefly as follows:—

To embark the instruments and their assistants by the 1st of June next for Valparaiso, for which place I shall leave New York per steamer, *via* Chagres and Panama, at the same time. As the voyage by this route may be readily made in thirty-five days, I shall be able to select a suitable station and make all necessary arrangements prior to the arrival of the instruments; but it is very probable that Santiago or Talca will be chosen for our operations, and from the solicitude expressed by the resident Chilian Chargé d'Affaires, the preponderance is on the side of Santiago. Moreover, it is thought that if Santiago is chosen and we remain nearly four years, as contemplated, the Chilian government will be induced to establish a permanent observatory there.

The observations I propose to make are,—Mars on the meridian and extra-meridian, during the oppositions of 1849 and 1852; and Venus under analogous conditions at the inferior conjunctions and stationary terms of 1850 and 1852. These observations will be differential, and (as the grant of congress implies) are the paramount objects of the expedition; but as they will occupy only a portion of our time, the following series have also been decided on:—

1st. With a view to improvement in the constant of lunar parallax, Burckhardt's semidiameter, and the local longitude, the moon and culminating stars on the meridian; both limbs at opposition and near conjunction.

2nd. The smaller planets on the meridian.

3rd. A catalogue of stars to the 8th magnitude inclusive, within 60° of the south pole.

Three hours of every suitable night will be given to this work, and the arrangement is such that the whole 60° may be examined and three observations made of each star within the proposed term of residence.

4th. Lunar occultations. Longitudes resulting from *culminations* as compared with *occultations*, have exhibited an *extraordinary* difference, to be accounted for perhaps by an error in the assumed semidiameter; this series of observations is considered necessary.

5th. It has been thought that useful information to terrestrial refractions will be obtained from observations in the two hemispheres on circum-zenith stars at each place of observation, and six stars have been selected which are near the zeniths of Talca and Washington to be observed on the meridian.

6th. Comets when discovered in the course of other observations, and at their periodic returns.

7th. Magnetical observations. The term-days of such observatories as continue to keep them has been set apart to obtain the three elements of the earth's magnetic condition, and on occasional term-days the observations would be made uninterruptedly during twenty-four hours with the declinometer.

8th. Meteorological observations at three stated hours (9 A.M., 3 P.M. and 9 P.M) of each day; to embrace records of barometer; dry, wet, radiating and registering thermometers; rain-gauge; wind-vane and clouds. Hourly observation on equinoctial and solstitial term-days.

9th. Earthquakes, the registrations of a seismometer.

A meridian circle of 3 feet diameter, with a telescope of 52 lines aperture, has been ordered from Pistor and Martins; the Smithsonian Institution has just authorized me to obtain an equatorial of 6 (French) inches aperture, with clock motion, which they will lend me; in addition to which I have a 48 lines equatorial by Fraunhofer; these, with a clock and one or two portable instruments, comprise my astronomical equipment. In magnetism I am most especially desirous of your advice. Pray give me all possible information, and recommend such instruments, times and methods of observation as our limited grant from congress and the number of assistants will enable me to obtain and use as designated.

Such of the meteorological instruments as we do not possess will be ordered in a few days; but for a proper seismometer I know not where to go, the only account seen being in one of the earlier volumes of the British Association. The instrument is to be obtained at the expense of the Smithsonian Institution, and if you will do us the favour to confer with some of the members of your Association or of the Royal Society who have taken interest in the investigation of earthquakes, you will especially oblige Professor Henry and myself. The opportunity which my residence in Chili will offer to make accurate notes of these occurrences may perhaps be productive of useful results. I do not doubt that the instrument will be ordered the moment I hear from you.

Whilst I have asked your views especially on magnetism, I shall be grateful for counsel respecting any of the observations which are contemplated, or for suggestions of new series which the locality offers peculiar advantages for making. I have planned this expedition and embark in it with a desire to render the greatest possible amount of useful data to science; and you may be assured of hearty zeal in whatever yourself or any of the Fellows of the Royal Society may propose.

Believe me, dear Sir, very respectfully,
Your friend and servant,
S. M. Gilliss.

Lieut.-Colonel Edward Sabine, R.A., F.R.S. &c.